FEATURE

Sweet on you

THE GOOD, THE BAD, AND THE UGLY OF SUGAR

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The sugary foods of our childhood that we longed for, saved up our allowance for, and dreamed of as holidays drew near, have moved from the place of occasional indulgences to the everyday. Sugar is now a staple of daily life for most people living in North America. It's found in almost every single product we purchase, from frozen pizzas, to granola bars, to pasta sauces (even those labelled organic!). Our sugar-fueled choices come at the cost of much-needed nutrients and have helped dictate the taste that our bodies crave and demand. Unsurprisingly, it is this unbalanced dependence on sugar that can be directly linked to an increase in health issues that, sadly, start in childhood.

GIMME *SOME* SUGAR

Through the process of evolution, humans brilliantly developed a mechanism to ensure sources of concentrated energy, like simple sugars, were eagerly consumed: the brain told the mouth that it tasted good! Biologically driven to seek out sugar, its consumption creates brain patterns in humans that are similar to those associated with opioid and alcohol abuse. While this mechanism served a purpose for our foraging ancestors, our drive to consume concentrated energy sources is no longer adaptive in our pre-packaged, refined-everything world. Yet this ancient genetic drive for survival still motivates us to consume sugar far beyond our energy requirements, leading to negative health consequences.

Sugar, particularly glucose, is needed by our bodies to create energy. The tightly regulated processes that govern the levels of glucose available to our systems at any given moment are put to the test when we ingest large amounts of sugar. Excess sugar is stored in the liver and muscle cells first and the rest is relegated to fat storage. The process was designed to maximize the body's ability to generate whatever glucose our cells need for energy through the digestion process. The problem is that our modern diet of too-much sugar and too many refined ingredients means a glucose surplus, which causes inflammation in the body and weight gain (in the form of fat storage). On the other hand, choosing a whole food diet, rich in fruits and veggies, proteins, and fibre, allows the body to access the sugar it needs, but at a slower, more sustained rate. This puts less stress on glucose regulation, prevents the storage of unused glucose that would turn into fat, and causes less inflammation in the body.

SUGAR HIGH

When we take in a large amount of simple sugar, we experience a sudden increase in available glucose, usually larger than the body needs in that moment. The pancreas responds by producing insulin, which is needed by most of the cells in the body to use and store sugar. The bigger the hit of sugar (often associated with a spike in energy), the larger the insulin release, and the more quickly and dramatically blood sugar levels drop again, which feels like a "crash" of energy levels. This cycle puts stress on our regulating processes; and when it happens again and again, the strain can lead to conditions such as type 2 diabetes, obesity, fatty liver, elevated cholesterol, and more.

OBESITY OVERLOAD

There is no question that being overweight or obese is far more common than it used to be. With the U.S. claiming the top spot for overweight or obese adults in the world at over 70%, Canada isn't far behind at 64%. Although there are multiple contributors to this epidemic, a large element is the typical North American diet; and while problematic for adults, it is perhaps even more of a concern for young children, adolescents, and teens. Not only are young bodies more likely to develop a myriad of health consequences associated with excess body weight, they are also more likely to become an overweight or obese adult.

Being overweight or obese during childhood may result in:

- Asthma
- Anxiety
- Depression
- Decreased muscular and bone health (often associated with pain)
- Early onset of puberty
- Polycystic ovarian syndrome*
- Elevated blood pressure*
- Abnormal blood sugar levels and diabetes*
- Fatty liver*

*Once known to occur in adulthood only, with the rising prevalence of obesity in childhood, these conditions, or their precursors, are now seen increasingly in children and adolescents.

In adulthood (especially if obesity starts in childhood):

- Diabetes
- High blood pressure
- Heart disease
- Stroke
- Kidney disease

What do you mean my liver is fat?

When the body has too much fuel stored for its needs, it starts to be deposited in places that can be harmful, including the liver. When there is too much fat in the liver, it can't perform its necessary function of clearing the bloodstream of waste and toxins. Over time, this can permanently damage the liver and the body's detoxification capacity. In the early stages, fatty liver can be reversed with a healthy diet and adequate physical activity.

MICROBIOME BREAKDOWN

The community of naturally occurring bacteria in our gastrointestinal tract (the microbiome) influences how we digest and use food and affects other processes including mood, immunity, cognitive function, and body composition. Our dietary choices directly impact the health and balance of our digestive organisms. When we consume a high-sugar diet, we feed a different array of microorganisms, including harmful ones that can skew immune function, mental health, and metabolism.

IMMUNE MALFUNCTION

A diet high in sugar has notable effects on immune system function. Conditions like *dysbiosis*, an imbalance of the bacterial community in the gut that results in susceptibility to illnesses and infections, and a stressed-out metabolic system due to high blood sugar levels can negatively affect the immune system's ability to do its job. In the short term, both high blood sugar and dysbiosis impact the functioning of white (i.e. immune) blood cells, leading to more frequent infections. In the long term, persistent metabolic stress increases inflammation throughout the body, contributing to conditions such as asthma, elevated blood pressure, and poor mood.

Simply complex

There are three main types of carbohydrates: sugar, starch, and fibre.

SUGAR
Monosaccharides, which contain a single sugar molecule, are the smallest carbohydrates and the building blocks from which all other carbohydrates are built. They are easily broken down and cause a rapid increase in blood sugar. *Monosaccharides* include glucose, fructose (found in fruits and vegetables), and galactose (in milk and yogurt), and when two monosaccharides react and join together, *disaccharides* like lactose, sucrose, and maltose are formed. Unlike tiny monosaccharides, disaccharides are larger and cannot pass through cell membranes, rather they must be broken down by the small intestine, so the body can either use or store them.

STARCH
Made up of longer chains of sugar molecules, starches are considered "complex" carbohydrates, because they take longer to be broken down as fuel for the body so the effect on blood sugar isn't as rapid. Vegetables, beans, legumes, and grains are all rich in starch.

FIBRE
Found in plant foods and whole grains, fibre is also considered a complex carbohydrate with the added benefit of being undigestible to humans. This means that fibre helps us feel full, reduces the rate at which carbohydrates are broken down and absorbed, helps food move through the digestive system, and aids in the elimination of stuff the body doesn't need.

The ethics of sugar

The refined sugars found in our pantries have a dark and troubled history. From the slave atrocities on sugar plantations to the complex relationship between the American sugar industry and government, to current human rights abuses, sugar comes at a cost.

Choosing fair-trade products like chocolate, coffee, and sugar is a good way to make sure that you're doing your part to advocate for labourers and small-scale farms around the world. Although more expensive than regular brands, choosing fair-trade ensures workers are paid a fair wage and have safe working conditions, and landowners are paid a fair price for their product. The higher price is also an incentive to consume less and with more gratitude and mindfulness.

GUT-BRAIN DISCONNECTION

Cognitive functions such as learning, thinking, memory, and attention are linked to glucose levels in the brain. Excess amounts of glucose can lead to a decline in these functions. When too much sugar is consistently consumed, a person can experience "brain fog": fuzzy, unclear thoughts and an inability to focus. Although peer-reviewed evidence does not demonstrate a direct correlation between sugar intake and ADHD or hyperactivity issues, many parents note that when their kids have too much sugar it can impact their energy levels and can lead to troublesome behaviour. In addition to the direct effects of sugar on mental function, excess sugar consumption can displace brain-nourishing foods, contributing to mental health issues such as anxiety and depression. This is exacerbated by the harmful effects of excess sugar on the health of the gut microbiome, which can also negatively influence mood and cognitive function.

NERVE CENTRE

Persistently high blood sugar levels also cause damage to nerve cells directly, which, over time (such as in the case of poorly managed diabetes), can cause abnormal sensations, including visual defects and loss of feeling in the feet and hands.

ORAL DISAGREEMENT

Helpful microorganisms also exist within the mouth and when they are exposed to sugar a chemical reaction takes place, creating an acidic environment that leads to the breakdown of tooth enamel and, in turn, encourages cavities. Sugar hangs around in the mouth, sticking to teeth and affecting their overall quality (plaque and cavities), which is why discouraging the consumption of sugary drinks such as juice, pop, or even too much milk during, or in-between, meals, is a foundational policy worth putting in place right from the start!

SWEET AS HONEY

We are inundated by ads claiming they've got the "healthy" sugar alternative. But the reality is there's no such thing. Although some sweeteners may be less questionable ethically or nutritionally, all still have their sticking points. The bottom line: sugar by any other name is still sugar, and affects the body similarly.

Contrary to popular belief, artificial sweeteners aren't really a solution either. Not only are they lacking in any nutritional value, they may not actually help with obesity and obesity-related health conditions. A number of studies have attempted to find associations between the use of artificial sweeteners and negative health outcomes with concerns raised about various types of cancer (particularly of the urinary tract), chronic kidney disease, and cognitive/mental health. Unfortunately, the data is still inconclusive and high-quality reviews are needed. The best strategy, especially for kids? Train their palates to enjoy non-sweet flavours.

To your body, a sugar by any other name is still sugar!

- Agave Nectar
- Barley Malt Syrup
- Corn Sweetener
- Corn Syrup
- Dehydrated Cane Juice
- Dextrin
- Dextrose
- Equal
- Fructose
- Fruit Juice Concentrate
- Glucose
- High Fructose Corn Syrup
- Honey
- Invert Sugar
- Lactose
- Maltodextrin
- Maltose
- Malt Syrup
- Molasses
- Raw Sugar
- Rice Syrup
- Saccharose
- Sorghum (Syrup)
- Splenda
- Stevia
- Sucrose
- Sweet 'n' Low
- Syrup
- Treacle
- Truvia
- Turbinado Sugar
- Xylitol
- Xylose

SUGAR SHAKEDOWN

Sugar Babies

One of the easiest ways to prevent little ones from developing a preoccupation with sugar is to prepare them right from the very beginning by introducing them to a wide variety of flavours, even before they're born! Both breastmilk and amniotic fluid are infused with the aromas of the foods that the pregnant individual consumes, so the more pungent, bitter, sour, and fragrant flavours consumed during pregnancy and breastfeeding, the more familiar these will be to baby as they venture into the world of food.

Sweet Young Thing

Because of our innate drive for the sweet stuff, babies still naturally desire it, and indeed require it to some degree. Choose plant-based options that have higher amounts of fibre, like pears, sweet potatoes, bananas, squash, and avocados, all of which are great for solid food introduction. They're easy to mash and lend themselves well to baby-led weaning, are full of vitamins and minerals, and have tremendous flavour. Incorporating healthy, whole foods right from the beginning can help establish healthy eating habits.

Sweet Talk

Eating together as a family encourages appropriate portion sizes, healthier and more diverse food choices, and has been shown to improve academic performance and reduce risky behaviour in adolescents. During this time it is also important to remove cell phones and other distractions so family members can focus on one another, as well as on the taste and texture of the foods they are eating. This helps to establish proper digestion, a broader appreciation of flavours, and an increasing awareness of hunger and satiety cues.

Let's be honest: sugary snacks are usually consumed because they're tasty and convenient, rather than truly needed by our bodies. Encourage your child to pause before digging in, and to pay close attention to the desire for that sweet treat. Some questions to ask:

1. Am I actually hungry?
2. Is my mouth hungry? Do I just want something sweet?
3. Is my spirit hungry? Am I bored, sad, or angry?

Teaching your child to recognize the difference between actual hunger and perceived hunger will help them meet that particular need more appropriately.

SWEET REWARDS

Children should never be bribed or punished with food. When we demonstrate that a job well-done is rewarded with non-nutritious food (or, conversely, if "treats" are withdrawn for poor behaviour), children begin to develop an unhealthy emotional relationship with food, often centered around sugar.

THE SWEET SPOT

In 2015 the World Health Organization released guidelines recommending that less than 10% (and ideally less than 5%) of an individual's total daily caloric intake be derived from added sugar (not including natural sugars found in fruits and vegetables), with Canada and U.S. guidelines similarly limiting added sugars to less than 10%. As you'll see, the average child consumes much, much more!

Age group/ daily calorie recommendations	Actual sugar intake / percent total calories	WHO recommendations (<5%)	Canada/US guidelines (<10%)
2-8 years 1560 kcal	101 g (24 tsp) 25.9%	19.5 g (4.6 tsp)	39 g (9.2 tsp)
9-18 years 2050 kcal	115 g (27 tsp) 22.4%	25.6 g (6.4 tsp)	51.2 g (12.8 tsp)